



National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Material[®] 1897

Specific Surface Area Standard

This Standard Reference Material (SRM) is intended for use in the calibration of instruments used to measure specific area (SSA) in the range of 0.1 m²/g to 1000 m²/g. The SSA of this material was measured using a nitrogen gas static volumetric Branauer-Emmett-Teller (BET) surface area analysis instrument. A unit of SRM 1897 consists of one vial containing approximately 7 g of a silica-alumina compound sieved to pass a 106 µm (number 140) sieve.

Certified Value: The results are expressed as the certified values \pm the expanded uncertainties (Table 1). The certified values are weighted averages [1] of measurements from ten laboratories. The expanded uncertainties, at the 95 % level of confidence are calculated as $U = ku_c$, where u_c is a combined standard uncertainty for the average, calculated according to the ISO Guide [1,2], and $k = 2$ is the coverage factor. The value of u_c in each case includes both a combined estimate of the variation of the averages attributed to each source and an allowance for differences among those averages.

Table 1. Certified SSA Values for SRM 1897

Measurement Technique	Specific Surface Area
Multi-Point	258.32 \pm 5.29 m ² /g
Single Point	253.08 \pm 5.34 m ² /g

Expiration of Certification: The certification of this SRM is considered valid until **01 October 2010**, within the uncertainty specified, provided that the SRM is handled and used in accordance with the Instructions for Use section of this certificate. The certification is considered nullified if the SRM is damaged, contaminated, or otherwise modified.

Stability: This material is considered to be stable during the period of certification. NIST will monitor this material and will report any significant changes in certification to the purchaser. Return of the attached registration card will facilitate notification.

Coordination of the technical measurements leading to the certification of this SRM was provided by S. Jahanmir of the NIST Ceramics Division.

Statistical consultation for this SRM was provided by S.D. Leigh of the NIST Statistical Engineering Division.

Analytical measurements for the certification of this SRM were performed by D.B. Minor of the NIST Ceramics Division.

Support aspects in the preparation, certification, and issuance of this SRM were coordinated through the NIST Standard Reference Materials Group by B.S. MacDonald.

Stephen W. Freiman, Chief
Ceramics Division

Gaithersburg, MD 20899
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John Rumble, Jr., Chief
Measurement Services Division

INSTRUCTIONS FOR USE

The silica-alumina powder is somewhat hygroscopic and the following procedure is recommended for sample preparation prior to analysis. Slowly, 1 °C/minute above 60 °C, heat the sample to 95 °C to 100 °C for a period of 1 hour to 1.5 hours and hold at 95 °C to 100 °C for at least 30 minutes while under a vacuum of at least 50 mTorr. **CAUTION:** The sample may appear to “boil” and possibly lose sample near 100 °C due to rapid de-watering. To prevent sample loss, the use of a large diameter sample bowl is recommended. The sample size should be between 0.25 g to 0.50 g. Cool the sample to ambient temperature under vacuum before analysis. Perform the analysis in accordance with the instructions of the instrument manufacturer or the procedures of your laboratory.

Participating Laboratories in the Round Robin

SASOL North America, Inc.; Austin, TX

Quantachrome Corporation; Boynton Beach, FL

U.S. Naval Research Laboratories; Washington, DC

Air Products and Chemicals, Inc.; Allentown, PA

Micromeritics Corporation; Norcross, GA

E.I. DuPont de Nemours and Co., Inc., Experimental Station; Wilmington, DE

Guild Associates, Inc.; Dublin, OH

New York State College of Ceramics at Alfred University; Alfred, NY

Eastman Kodak Company, Research & Development Laboratories; Rochester, NY

National Institute of Standards and Technology, Ceramics Division; Gaithersburg, MD

REFERENCES

- [1] *Guide to the Expression of Uncertainty in Measurement*, ISBN 92-67-10188-9, 1st Ed., ISO, Geneva, Switzerland (1993); see also Taylor, B.N.; Kuyatt, C.E.; *Guideline for Evaluating and Expressing the Uncertainty of NIST Measurement Results*, NIST Technical Note 1297, U.S. Government Printing Office, Washington, DC (1994); available at <http://physics.nist.gov/Pubs/>. See also Heckert, A; Filliben, J.J.; *Dataplot Reference Manual*, <http://www.itl.nist.gov/div898/software/dataplot/>.
- [2] Rukhin, A.L.; Vangel, M.G.; *Estimates of a Common Mean and Weighted Means Statistics*, Journal of American Statistical Association, Vol. 93, No. 441, pp. 303-308 (March 1998).

Users of this SRM should ensure that the certificate in their possession is current. This can be accomplished by contacting the SRM Program at: telephone (301) 975-6776; fax (301) 926-4751; e-mail srminfo@nist.gov; or via the Internet <http://www.nist.gov/srm>.